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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION
No. 33671 A.D. 1948.

New or Improved Lighting Apparatus

I, ROLLO GILLESPIE WILLIAMS, a British Subject, of Apartment 1z, 20, Clent Road, Great Neck, Long Island, New York, United States of America, do hereby declare the nature of this invention to be as follows:—

This invention is for new or improved lighting apparatus and has particular but not exclusive reference to spotlights.

The essential object of the invention is to enable a number of light beams of different colours or a number of light sources each giving a light of different colour to provide illumination which can be blended into one final beam of light.

It is sometimes desired to mingle the light of a plurality of colours such for example as the four colours, white, red, green and blue, in such a manner that by blending the lights in different proportions different colour hues are obtained. If four spotlights corresponding to these four colours are mounted close together, it will be found that undesirable colour shadows are created and the four beams do not generally intermingle sufficiently to avoid what is known as colour fringing.

It is therefore desired that these beams should be so intermingled that the colours in question can be sufficiently combined to avoid these phenomena, and an object of the present invention is to provide apparatus whereby this result may be achieved. It is to be understood however that this invention applies to the combination of any required number of coloured light sources, and that the number "four" is quoted as an example. Also the source can be arranged to give any desired colour of light and means may be employed for varying the colour and/or intensity of the useful emitted light. For example, in the case of a plurality of light sources, individual dimmers may be employed to vary the useful emitted light.

Other specific objects of the invention are to provide means for mixing coloured lights which are simple in construction and design, are comparatively inexpensive to make, are compact and comparatively small in size, are easily and readily maintenanced and are possessed of a high degree of lighting efficiency.

With the above and other objects in view the invention from one aspect, consists in a light transmission system consisting of at least two light reflecting systems so arranged and constructed that a predetermined proportion of emitted light is transmitted independently of said system and the remainder is reflected from the first to the second system and from such latter system is transmitted in substantial parallel spaced relation to the independently transmitted light.

From another aspect the invention consists in the provision of a light transmitter consisting of at least two truncated conical or pyramidal reflecting surfaces disposed in an opposed sense about a common axis with their bases remote from each other; the two truncated conical reflecting surfaces may be the same as or different from one another as desired; they may be symmetrical or asymetrical and the expression truncated conical reflecting surface as used herein where the context so permits, means and includes a multi-sided member having the general outline of a truncated cone. In particular, one of the reflecting surfaces may be constituted by a single surface (conical) and the other is constituted by a plurality of surfaces (pyramidal).

The invention further consists in the provision of a plurality of light sources, means for transmitting different coloured light from or via each or selected thereof, at least two reflecting systems, the one of said systems reflecting a proportion of the emitted light from at least one of said sources on to the other system and said latter system reflecting said reflected light in substantial parallelism and in spaced relation to the remaining proportion of

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the emitted light from said source.

In the alternative a single light source is employed and means are provided whereby two or more substantially parallel light beams of different colour or hue are obtained from said single source and a proportion of one or more of said beams is/are applied to said reflecting systems in the manner set out in the preceding paragraph.

In carrying the invention into effect the two reflecting systems may be spaced from one another or otherwise as desired but in the latter event they are preferably connected by an opaque connection. The reflecting surface of each or either system may be ribbed, fluted, smooth, indented or irregular. The reflecting systems or either thereof may include a transparent part or parts for the non-reflected light.

The invention resides both in the provision of a complete lighting system for transmitting light and in a transmitter for use with a lighting system.

In order that the invention may be more readily understood, reference will now be made to the accompanying drawings in which:—

Figure 1 is a diagrammatic elevational view illustrating by way of example one form of the invention, having four lamps, a third lamp which should appear in this view being omitted for simplification of the figure;

Figure 2 is an underneath plan view thereof, showing all four lamps; and

Figure 3 is a perspective view of one type of reflector in accordance with this invention.

In the embodiment illustrated there are four sources of light, R, W, B, and G, each constituted by an electric lamp bulb. It will be appreciated that any suitable source of light may be employed and reflector spot lamps have been found to be suitable.

Each lamp depends from a lamp holder 1 and the lamps are arranged annularly equally spaced from one another. The lamp holders 1 may be located interiorly of a suitable casing indicated generally at 2 which may be provided with any convenient means for mounting or attaching it to any desired member. Disposed at a convenient position below the bulbs R, G, and B, is a colour filter 3. In the particular embodiment under discussion it will be assumed that lamp R will emit (through its associated filter) a red beam, lamp G a green beam, lamp B a blue beam and lamp W a white beam but it will be obvious that any desired colour or colours may be obtained and the number of different coloured beams emitted can be varied as desired. Furthermore, instead of using filters the lamps themselves may emit coloured light.

In a still further alternative parallel spaced beams of differently coloured light are obtained from a single source by any convenient means such as the use of prisms and filters.

Reverting to the embodiment of the invention illustrated it will be seen from Figure 1 that at a convenient distance below the filters 3 are located two truncated hollow cones 4 and 5 which are similar and symmetrical and have a common axis; they are arranged in an opposite sense with their bases remote from one another and with their other ends in contact with each other. The interior surfaces of members 4 and 5 are reflecting surfaces. The cones may, for example, be made of anodised aluminium but they may be made of any other suitable material provided they have a good reflecting surface.

It will be readily seen from Figure 1 that each lamp is so disposed in relation to the cones that a proportion of the emitted light passes through the aperture at the junction of the cones without impinging on any of the interior surfaces of the cones and that the remainder of the light passing vertically downwards in the vertical plane passing through the axes of the lamps R, B impinges upon the interior surface of the upper cone 4, from there is reflected to the interior surface of the lower cone 5 and from such latter surface is reflected substantially parallel to and in spaced relation with the light which passes through the cones without impinging upon any surface thereof.

For the purpose of convenience the light rays from lamp B only are shown on the drawing but it will be appreciated that the same conditions will apply to the rays emitted from all the lamps. The rays from lamp B which pass the cones without impinging upon any of the surfaces thereof are indicated at B.1 and the remaining rays shown are indicated at B.2.

An approximation of the reflecting surface area from which the rays B.2 are reflected from the lower cone 5 is indicated at B.3 in Figure 2 and it will be seen that that area is considerably greater than the area B.4 from which the light rays B.1 are emitted. This, as will readily be appreciated results in very efficient mixing of the colours. It will be appreciated that cones 4 and 5 are securely fixed within the casing 2 by any suitable and convenient means.

As previously stated, the embodiment just described is given merely by way of example and is not to be construed in a

limiting sense. The surface of either of the conical members 4 and 5 may be ribbed, fluted, indented or irregular and instead of being conical may be pyramidal or one may be conical and the other pyramidal and whether truncated cones or truncated pyramids are employed they may be symmerical or asymmetrical. Any convenient means, such as dimmers, may be employed for varying the intensity of light emitted from each lamp and means may be provided for varying the colour emitted from one or more of the lamps such as by providing displaceable filters.

It will be appreciated that a colour mixer in accordance with this invention can be produced comparatively inexpensively, is comparatively robust and has the further advantage that maintenance costs are very small.

Finally the cones instead of being hollow may be of translucent material with internal reflecting surfaces.

Dated this 31st day of December, 1948.

ERIC POTTER & CLARKSON,
Chartered Patent Agents,
Nottingham, Leicester and London.

PROVISIONAL SPECIFICATION
No. 31169 A.D. 1949.

New or Improved Lighting Apparatus

I, ROLLO GILLESPIE WILLIAMS, a British Subject, of Apartment 1z, 20, Clent Road, Great Neck, Long Island, New York, United States of America, do hereby declare the nature of this invention to be as follows:—

This invention is for new or improved lighting apparatus and has particular but not exclusive reference to spot lights. The invention is an improvement in or modification of the invention forming the subject matter of co-pending patent application No. 33671 of 1948. In the specification of said prior application there is disclosed a light transmission system consisting of at least two light reflecting systems so arranged and constructed that a predetermined proportion of emitted light is transmitted independently of said system and the remainder is reflected from the first to the second system and from such latter system is transmitted in substantial parallel spaced relation to the independently transmitted light.

It has been found in practice that under certain circumstances there exists the possibility of part of the emitted light which is transmitted independently of said system "spilling"; that is to say non-parallel or stray rays of light are emitted and the principal object of the present invention is to obviate or minimise this objection.

With the above object in view the invention consists in the provision in a system of the said type of means for ensuring that the emitted light which is transmitted independently of the said system (hereinafter referred to as "independent light") is confined to parallel rays of light.

In a preferred method of carrying the invention into effect louvres or shields are provided and are so located relatively to the light source or each light source to ensure that the independent light is transmitted only in parallel rays.

In order that the nature of the invention may be more readily understood reference will now be made to the accompanying drawings in which:—

Figure 1 is a diagrammatic elevational view illustrating by way of example one method of carrying the invention into effect and embodying four lamps, a third lamp which should appear in said view being omitted for simplification of the figure; and

Figure 2 is a plan thereof showing all four lamps.

In the embodiment illustrated there are four sources of light, R, W, B and G, each constituted by an electric lamp bulb. It will be appreciated that any suitable source of light may be employed and reflector spot lamps have been found to be suitable.

Each lamp depends from a lamp holder 1 and the lamps are arranged annularly equally spaced from one another. The lamp holders 1 may be located interiorly of a suitable casing indicated generally at 2 which may be provided with any convenient means for mounting or attaching it to any desired member. Disposed at a convenient position below each of the bulbs R, G, and B is a colour filter 3. In the particular embodiment under discussion it will be assumed that lamp R will emit (through its associated filter) a red beam, lamp G a green beam, lamp B a blue beam and lamp W a white beam but it will be obvious that any desired colour or colours may be obtained and the number of different coloured beams emitted can be varied as desired. Further-

more, instead of using filters the lamps themselves may emit coloured light.

At a convenient distance below the filters 3 are located two truncated hollow cones 4 and 5 which are similar and symmetrical and have a common axis; they are arranged in an opposite sense with their bases remote from one another and with their other ends in contact with each other. The interior surfaces of members 4 and 5 are reflecting surfaces. The cones may, for example, be made of anodised aluminium but they may be made of any other suitable material provided they have a good reflecting surface.

It will be readily seen from Figure 1 that each lamp is so disposed in relation to the cones that a proportion of the emitted light (independent light) passes through the aperture at the junction of the cones without impinging on any of the interior surfaces of the cones and that the remainder of the light impinges upon the interior surface of the upper cone 4, from there is reflected to the interior surface of the lower cone 5 and from such latter surface is reflected substantially parallel to and in spaced relation with the light which passes through the cones without impinging upon any surface thereof.

It will be appreciated that there is a tendency for light to " spill " from each filter; that is to say there is a tendency for light rays to be emitted in the direction of the arrows X. In so far as concerns the rays which impinge upon the cones the spilled light impinges upon the casing 2 and can be ignored but in so far as concerns the independent light the rays X moving to the left from bulb B (in Figure 1) will intermingle with the rays X moving to the right from the bulb R and in order to avoid this spilling (which of course, occurs at all points of emission of the independent light) and the consequential diffusion arcuate louvres or shields 6 are provided as shown. There are conveniently a series of coaxial louvres the lengths of which are stepped as shown, those furthest from the axis being of greatest length and extending to a position beyond the upper edge of cone 4. The louvres may be of any suitable material and are opaque to light and extend parallel to one another and to the axes of the cones. It thus follows that any spilling of the independent light is positively prevented.

The lamp bulbs may be of any suitable type but are preferably of the reflector type and for the purpose of compactness may be of low voltage (e.g. 6 or 12 volts). It may be said that reflector type bulbs comprise a glass or other suitable bulb which is externally prepared as a reflector and silvered or similarly treated on the interior surface.

Dated this 2nd day of December, 1949.

ERIC POTTER & CLARKSON,
Chartered Patent Agents,
Nottingham and London.

COMPLETE SPECIFICATION

New or Improved Lighting Apparatus

I, ROLLO GILLESPIE WILLIAMS, a British Subject, of Apartment 1z, 20, Clent Road, Great Neck, Long Island, New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention is for new or improved lighting apparatus and has particular but not exclusive reference to spotlights.

The essential object of the invention is to enable a number of light beams of different colours or a number of light sources each giving a light of different colour to provide illumination which can be blended into one final beam of light.

It is sometimes desired to mingle the light of a plurality of colours such for example as the four colours, white, red, green and blue, in such a manner that by blending the lights in different proportions different colour hues are obtained. If four spotlights corresponding to these four colours are mounted close together, it will be found that undesirable colour shadows are created and the four beams do not generally intermingle sufficiently to avoid what is known as colour fringing.

It is therefore desired that these beams should be so intermingled that the colours in question can be sufficiently combined to avoid these phenomena, and an object of the present invention is to provide an improved apparatus whereby this result may be achieved. It is to be understood however that this invention applies to the combination of any required number of coloured light sources, and that the number " four " is quoted merely as an example. Also the or each source can be arranged to give any desired colour of light and means may be employed for varying the colour and/or intensity of the

useful emitted light. For example, in the case of a plurality of light sources, individual dimmers may be employed to vary the useful emitted light.

Other specific objects of the invention are to provide improved means for mixing coloured lights which are simple in construction and design, are comparatively inexpensive to make, are compact and comparatively small in size, are easily and readily maintained and are possessed of a high degree of lighting efficiency.

In the specification of my Patent No. 646,642 there is described and claimed in colour lighting apparatus the combination of means so arranged as to split each of several major beams of different colours into a plurality of component beams, means so arranged as to transpose at least some of the component beams so as to mingle the colours and means so arranged as to combine the component beams into a unitary beam in their transposed relationship. The expression "major beam" is used in said specification to indicate a beam from any convenient source of light and includes a plurality of beams derived from a single beam, and may also mean the flux of light allocated to any one colour before the splitting takes place.

The present invention consists in a lighting apparatus comprising means for emitting a plurality of light beams of different colour, and a plurality of light-reflecting surfaces, all arranged so that at least one of each such light beam has a portion reflected by successive reflecting surfaces and another portion unreflected thereby, so that the several reflected and unreflected portions of all the beams are emitted finally in scrambled relationship but substantially parallel. The term "a plurality" is to be taken in each case as meaning two or more, and the term "scrambled" must be read as meaning that in the final beam no portion which has been reflected is adjacent an unreflected portion from the same original beam.

The invention as set forth in the previous paragraph may be characterised in that the successive reflecting surfaces consist of at least two truncated conical or pyramidal reflecting surfaces, adjacent surfaces being disposed in an opposed sense about a common axis with their bases remote from each other; the truncated conical reflecting surfaces may be the same as or different from one another as desired; they may be symmetrical or asymmetrical for example as oblique truncated cones or pyramids and the expression truncated conical reflecting surface as used herein means, where the context so permits, and includes a multi-sided member having the general outline of a truncated cone. In particular, one of the reflecting surfaces may be constituted by a single continuous surface (conical) and the other constituted by a side-by-side assembly of surface elements (pyramidal).

There may be a plurality of independent light sources of different colour, or alternatively a single light source may be employed and means may be provided whereby two or more substantially parallel light beams of different colour or hue are obtained from said single source, and a proportion of one or more of said beams is applied to said reflecting surfaces in the manner set out above.

In a modification for the purpose of ensuring the elimination of stray rays or "spillage" of light emitted by the source or sources, there may be provided in a lighting apparatus as aforesaid means for ensuring that the emitted light which is transmitted independently of the said system (hereinafter referred to as "independent light") is confined to parallel or nearly parallel rays of light.

In a preferred mode of confining the independent light to parallel or nearly parallel rays, louvres or shields may be provided and so located relatively to the light source or each light source as to ensure that the independent light is transmitted only in parallel rays. When the reflecting surfaces are conical, the lengths of the outermost or some of the outer elements of each louvre may be such that they extend into the reflector nearest to them.

In carrying the invention into effect two reflecting surfaces may be spaced from one another or otherwise as desired but when spaced apart they are preferably connected by an opaque connection. Each reflecting surface may be ribbed, fluted, smooth, indented or irregular. The apparatus may include a transparent part or parts for the non-reflected light.

In order that the invention may be more readily understood, reference will now be made to the accompanying drawings in which:—

Figure 1 is a diagrammatic elevational view illustrating by way of example one form of the invention, having four lamps, a third lamp which should appear in said view being omitted for simplification of the figure;

Figure 2 is an underneath plan view thereof, showing all four lamps.

Figure 3 is a perspective view of one type of reflector for use in the lighting apparatus illustrated in Figures 1 and 2.

Figure 4 is a diagrammatic elevational

view illustrating by way of example a modified form of the invention.

Figure 5 is an underneath plan view of the form illustrated in Figure 4.

Figures 6, 7, 8, and 9 are views similar to Figure 1 showing further modified forms of the invention.

In the embodiment illustrated in Figures 1 to 3 there are four sources of light R, W, B and G, each constituted by an electric lamp bulb. It will be appreciated that any suitable source of light may be employed and reflector spot lamps have been found to be suitable.

Each lamp depends from a lamp holder 1 and the lamps are arranged annularly equally spaced from one another. The lamp holders 1 may be located interiorly of a suitable casing indicated generally at 2 which may be provided with any convenient means for mounting or attaching it to any desired member. Disposed at a convenient position below each of the bulbs R, G and B, is a colour filter 3. In the particular embodiment under discussion it will be assumed that lamp R will emit (through its associated filter) a red beam, lamp G a green beam, lamp B a blue beam and lamp W a white beam but it will be obvious that any desired colour or colours may be obtained and the number of different coloured beams emitted can be varied as desired. Furthermore, instead of using filters the lamps themselves may emit coloured light.

In a still further alternative, parallel spaced beams of differently coloured light are obtained from a single source by any convenient means such as the use of prisms and filters.

Reverting to the embodiment of the invention illustrated it will be seen from Figure 1 that at a convenient distance below the filters 3 are located two truncated hollow cones 4 and 5 which are similar and symmetrical and have a common axis; they are arranged in an opposite sense with their bases remote from one another and with their other ends in contact with each other. The interior surfaces of members 4 and 5 are reflecting surfaces. The cones may, for example, be made of anodised aluminium but they may be made of any other suitable material provided they have a good reflecting surface, and securely fixed within the casing 2 by any suitable and convenient means.

It will be readily seen from Figure 1 that each lamp is so disposed in relation to the cones that a proportion of the emitted light (independent light) passes through the aperture at the junction of the cones without impinging on any of the interior surfaces of the cones.

As shown the axes of the lamps substantially intersect the circle at which the cones 4 and 5 are joined. The remainder of the light passing vertically downwards in the vertical plane passing through the axes of the lamps R, B, impinges upon the interior surface of the upper cone 4, from there is reflected to the interior surface of the lower cone 5 and from such latter surface is reflected substantially parallel to and in spaced relation with the independent light which passes through the cones without impinging upon any surface thereof.

For the purpose of convenience the light rays from lamps B and R are shown in Figure 1 of the drawings, but it will be appreciated that the same conditions will apply to the rays emitted from all the lamps. The rays from lamps B and R which pass the cones without impinging upon any of the surfaces thereof are indicated at B1 and R1 respectively, and the remaining rays shown are indicated at B2 and R2 respectively.

An approximation of the reflecting surface area from which the rays B2 are reflected from the lower cone 5 is indicated at B1 in Figure 2 and it will be seen that that area is considerably greater than the area B4 from which the light rays B1 are emitted. This, as will readily be appreciated, results in very efficient mixing of the colours.

As previously stated, the embodiment just described is given merely by way of example and is not to be construed in a limiting sense. The surface of either of the conical members 4 and 5 may be ribbed, fluted, indented or irregular and instead of being conical may be pyramidal or one may be conical and the other pyramidal and whether truncated cones or truncated pyramids are employed they may be symmetrical or asymmetrical. Any convenient means, such as dimmers, may be employed for varying the intensity of light emitted from each lamp and means may be provided for varying the colour emitted from one or more of the lamps such as by providing displaceable filters.

It will be appreciated that in the arrangement shown in Figure 1, there is a tendency for light to spill from each of the filters 3; that is to say, there is a tendency for light rays to be emitted in the directions of the arrows X, (Fig. 4).

Referring to Figure 4, insofar as concerns the rays which impinge upon the cones, the spilled light impinges upon the interior of the casing 2 which may advantageously be of non-reflecting material so that such spilled light can be ignored. However, insofar as concerns the indepen-

dent light, the rays X which emerge to the left from lamp B in Figure 4 will intermingle with the rays X emerging to the right from the lamp R and in order to avoid this spilling (which, of course, occurs at all points of emission of the independent light) and the consequential diffusion, arcuate louvres or shields 6 are provided, as shown. There are conveniently a series of coaxial semi-cylindrical louvres as can be seen in Figure 5, the lengths of which are stepped as shown in Figure 4, those farthest from the axis being of greatest length and preferably extending to a position beyond the plane of the upper edge of the cone 4. The louvres may be of any suitable material and are opaque to light and extend parallel to one another and to the common axis of the cones. It thus follows that any spilling of the independent light is positively prevented.

The lamp bulbs may be of any suitable type, but are preferably of the reflector type and for the purpose of compactness may be of low voltage (e.g. 6 to 12 volts). It may be said that reflector type bulbs comprise a glass or other suitable bulb which is externally prepared as a reflector and silvered or similarly treated on the interior surface.

It will be noted that in the forms shown in Figures 1 to 5, inclusive, those portions of the several light beams which bypass the reflectors pass through the aperture in the reflectors. Figure 6 shows a modified form in which that portion of the several beams of light which bypass the reflectors pass on the outside of reflectors 4*b* and 5*b*. This provides a similar scrambling or mixing of the light beams of different colours. In this form the reflectors are supported from the casing by means of arms 13. It will be noted that the light sources 11 and 12 are enclosed in reflectors 11*a* and 12*a* respectively, these reflectors being of parabolic or other similar cross-section to effect emission of parallel rays.

Figure 7 shows a form similar to that of Figure 6 except that the coloured glass plates 3 are made larger and arranged as close together as possible so that the beams of each colour are split into three portions, one of which passes directly through the apertures in the reflectors 4*c* and 5*c*, a second portion is reflected from reflector 4*c* to and from the reflector 5*c* and the third portion of each beam passes outside of the reflectors. It will be noted that with this form of the invention each beam is split into three parts so that if four light sources are used, twelve beams of various colours are emitted, and that these beams are thoroughly mixed or scrambled.

Figure 8 shows another form of the invention using a fairly small reflector 4*d* and a larger reflector 5*d*, they being so arranged that one portion of each beam passes between the reflectors whereas the balance of each beam is reflected from reflector 4*d* onto and from reflector 5*d*.

Figure 9 shows a form of construction similar to that of Figure 8, the difference being that the members 3 are made larger and located as close together as possible so that each beam is split into three parts, one part passing through the centre of reflectors 4*e* and 5*e*, another portion is reflected from reflector 4*e* onto and from reflector 5*e* and the third portion is emitted directly exteriorly of reflector 4*e* and interiorly of reflector 5*e*. This again splits each beam into three portions in scrambled or interspersed relation to portions of the beams of other colours.

It will be appreciated that a colour mixer in accordance with this invention can be produced comparatively inexpensively, is comparatively robust and has the further advantage that maintenance costs are very small.

Finally the cones instead of being hollow may be of translucent material with internal reflecting surfaces.

It will be noted that the constructions shown and described will serve admirably to accomplish the objects stated above. It is to be understood, however, that the constructions disclosed above are intended without limitation merely as illustrative of the invention, as various modifications therein may be made without exceeding the scope of the invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A lighting apparatus comprising means for emitting a plurality of light beams of different colour, and a plurality of light-reflecting surfaces, all arranged so that at least one of each such light beam has a portion reflected by successive reflecting surfaces and another portion unreflected thereby, so that the several reflected and unreflected portions of all the beams are emitted finally in scrambled but substantially parallel relationship.

2. A lighting apparatus according to Claim 1, wherein all the light beams have reflected and unreflected portions and wherein these are emitted finally as a single beam.

3. A lighting apparatus according to Claim 2, modified in that in the final emission some portions are spaced away

from other portions.

4. A lighting apparatus according to Claim 2 or 3, characterised in that the successive reflecting surfaces consist of at least two truncated conical or pyramidal reflecting surfaces, adjacent surfaces being disposed in an opposed sense about a common axis with their bases remote from each other.

5. A lighting apparatus according to Claim 4, wherein the two truncated reflecting surfaces are conjoined at their planes of truncation.

6. A light transmitter according to Claim 4, wherein the two truncated reflecting surfaces are spaced apart optionally being connected by opaque connecting means.

7. A lighting apparatus according to any of Claims 4 to 6, wherein the two truncated reflecting surfaces are of similar or identical geometrical form.

8. A lighting apparatus according to any of Claims 4 to 7, wherein the reflecting surfaces are symmetrical, e.g. right truncated cones or pyramids.

9. A lighting apparatus according to any of Claims 4 to 7, wherein the truncated reflecting surfaces are asymmetrical, such as, for example, oblique truncated cones or pyramids.

10. A lighting apparatus according to any of Claims 4, 5, 6, 7 and 8, wherein one of the reflecting surfaces is constituted by a continuous surface, such as a truncated cone, and the other reflecting surface is constituted by a plurality of elemental surfaces, such as a truncated pyramid.

11. A light apparatus as claimed in Claim 1, comprising a single light source and means whereby two or more substantially-parallel light beams of different colour are obtained from said single source and a proportion of at least one of said light beams is applied to said reflecting surfaces.

12. Lighting apparatus according to any of Claims 1—11, having louvres or shields so located relatively to the or each light source as to ensure that the light not applied to said reflecting surfaces is transmitted only in substantially parallel rays.

13. Lighting apparatus according to Claim 12, wherein a series of louvres is provided coaxial with the axis of the lamp or other light source.

14. Lighting apparatus according to Claim 13, wherein the coaxial louvres are semi-cylindrical.

15. Lighting apparatus according to Claim 12 or 13, wherein the coaxial louvre elements have lengths which increase progressively stepwise from the axis of the louvres outwards.

16. Lighting apparatus according to Claim 15, wherein the reflecting surfaces are conical and wherein the lengths of the outermost or some of the outer elements of each louvre are such that they extend into the reflector nearest to them.

17. Lighting apparatus according to any of Claims 9—15, wherein the two reflecting surfaces are provided each on a truncated conical or pyramidal reflecting member, such members being secured by their bases within the peripheral wall of a casing, so that the light emitted from the parts of the source or sources nearest the outer edge of the reflecting members is reflected and the light from the parts of the source or sources nearer the central axis of the reflectors is transmitted independently of said reflecting members.

18. Lighting apparatus according to Claim 16, wherein two reflecting surfaces are provided each on a truncated conical or pyramidal reflecting member, such members being secured coaxially within a casing and spaced apart from the peripheral wall of said casing, means for emitting a plurality of light beams of different colour which are substantially parallel light beams and which are so disposed relative to the reflecting members that the inner parts of the substantially parallel light beams emitted by said means impinge upon and are reflected by the reflecting members, and the outer parts of said beams are transmitted independently of said reflecting members between the outer margins of the bases of said members, and the inner peripheral wall of the casing.

19. A modification of the apparatus claimed in Claim 18, wherein the means for emitting a plurality of light beams of different colour emits substantially parallel light beams arranged in close proximity about the common axis of the reflecting members which are conjoined at their planes of truncation so that the inner parts of the substantially parallel light beams emitted by said source or sources are transmitted independently of the reflecting members through the aperture at the plane of conjunction of said members, the outer parts of said substantially parallel beams are transmitted independently between the margins of the bases of the reflecting members, and the peripheral wall of the casing, and the intermediate part of said beam or beams is transmitted by reflection from said reflecting members.

20. A modification of the apparatus claimed in Claim 17, wherein the greater diameter of the first reflecting member is less than the smaller diameter of the

second reflecting member, and the means for emitting a plurality of light beams of different colour is adapted to emit substantially parallel light beams and is so disposed relative to the common axis of said members that the inner parts of the substantially parallel light beams are transmitted by reflection and the outer parts of said beams are transmitted independently outside the base periphery of the first reflecting member and inside the smaller periphery of the second reflecting member.

21. A modification of the apparatus claimed in Claim 19, wherein the first reflecting member has its greater or base diameter less than the smaller diameter of the second reflecting member and the means for emitting a plurality of light beams of different colour is so arranged upon or in mutually close relationship about the axis of the reflecting members, so that the inner parts of the parallel beams emitted by said means are transmitted independently through the aperture through the smaller end of the first reflecting member, the outer part or parts of the beams are transmitted independently outside the larger periphery of the first reflecting member and inside the smaller periphery of the second reflecting member, and the intermediate parts of said beams are transmitted by reflection.

22. Lighting apparatus substantially as hereinbefore described with reference to Figures 1 to 3 or to Figures 4 and 5 of the accompanying drawings.

23. Lighting apparatus substantially as hereinbefore described with reference to Figure 6 or Figure 7 or Figure 8 or Figure 9 of the accompanying drawings.

Dated this 30th day of December, 1949.

ERIC POTTER & CLARKSON.
Chartered Patent Agents,
Nottingham and London.

Reference has been directed, in pursuance of Section 8, sub-section (2), of the Patents and Designs Acts, 1907 to 1946, to Specification No. 646,642.

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686,746 PROVISIONAL SPECIFICATION N°33671/48
1 SHEET
This drawing is a reproduction of the Original on a reduced scale.

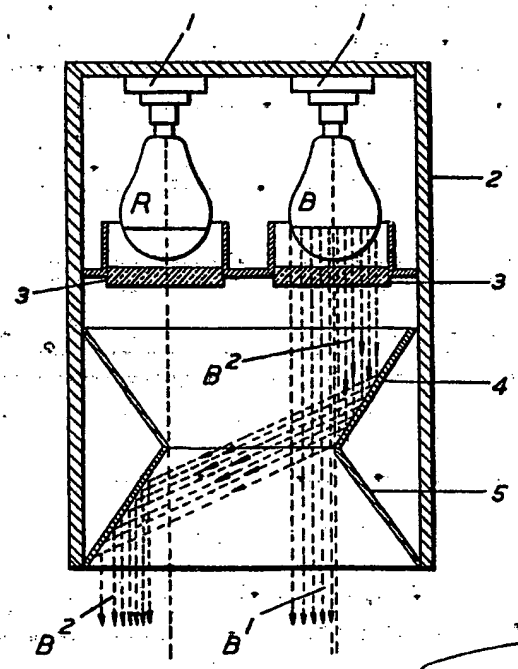


FIG.1.

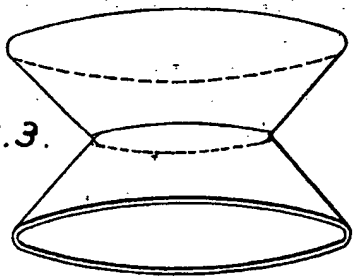


FIG.3.

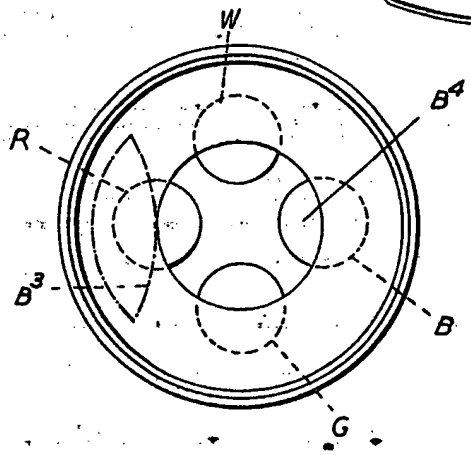


FIG.2.

686,746 PROVISIONAL SPECIFICATION Nº 31,169/49
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

FIG. 1.

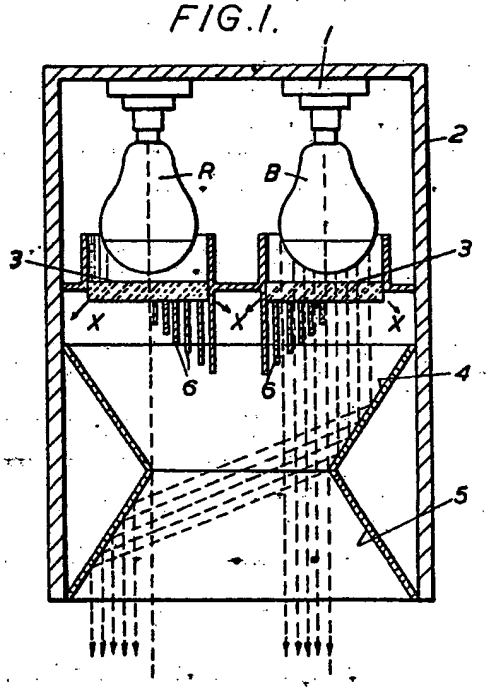
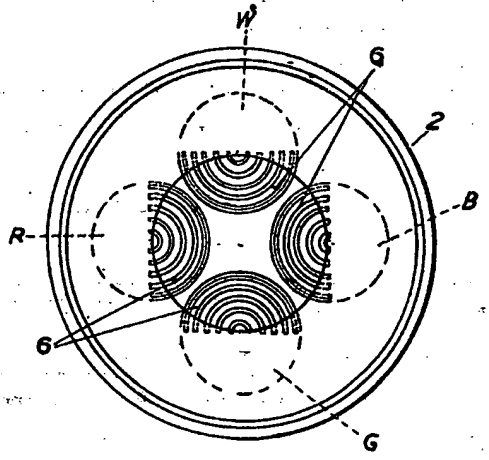


FIG. 2.



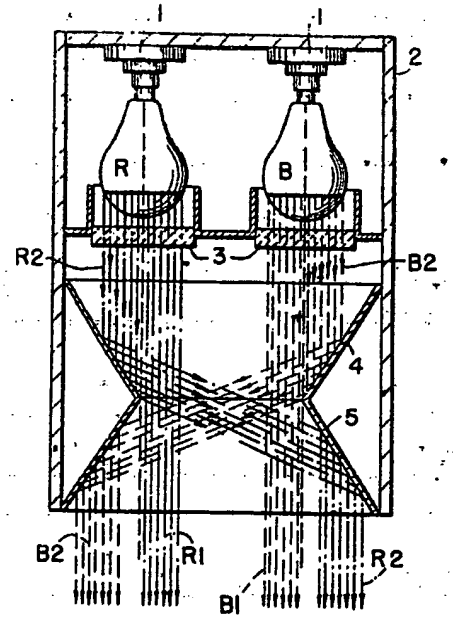


Fig-1-

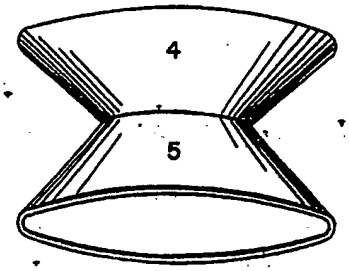


Fig-3-

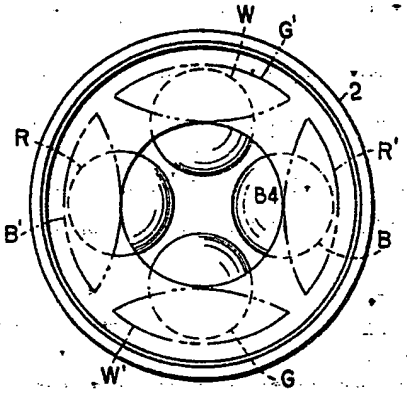


Fig-2-

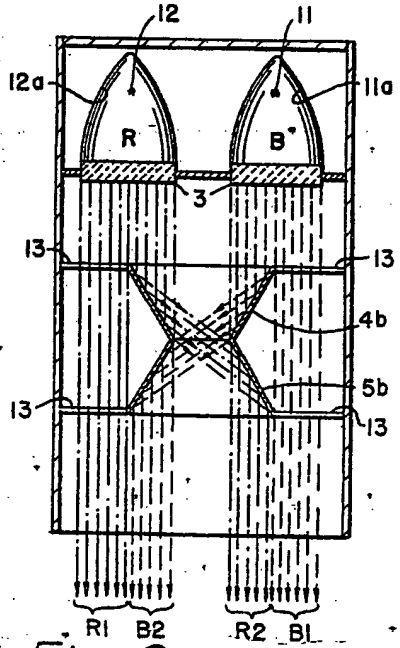


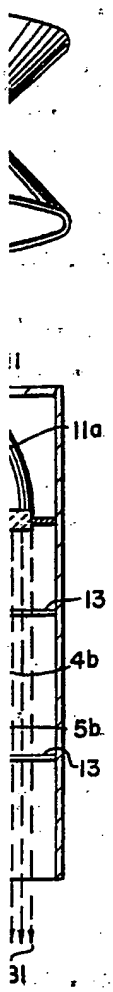
Fig-6-

686,746 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*

SHEETS 1 & 2

3-



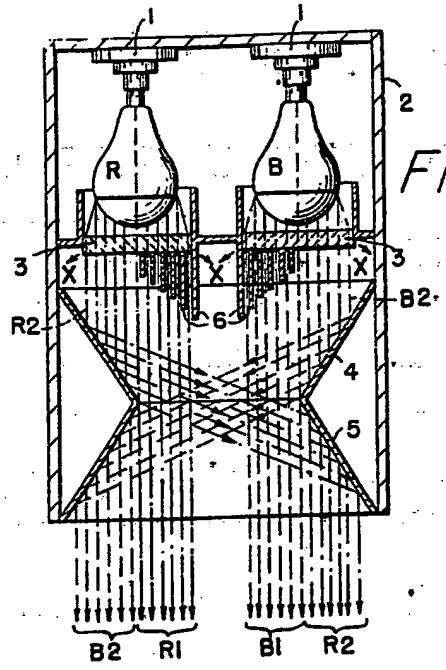


Fig-4-

Fig-5

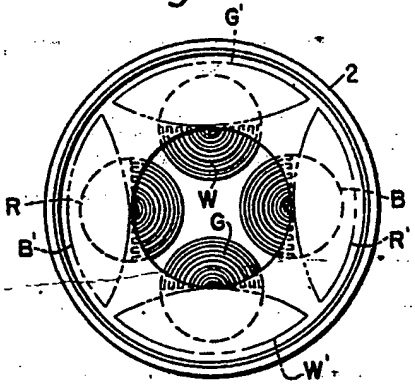
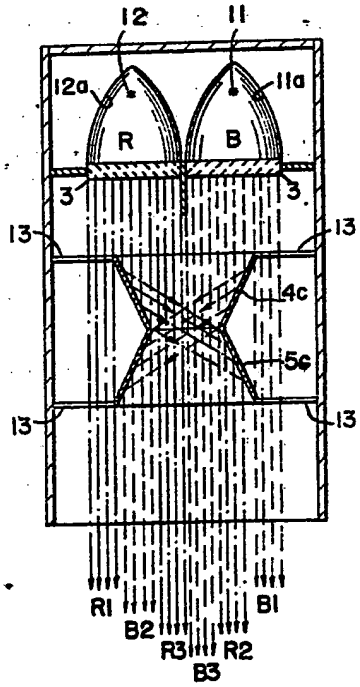


Fig-7-



686,746 COMPLETE SPECIFICATION
3 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

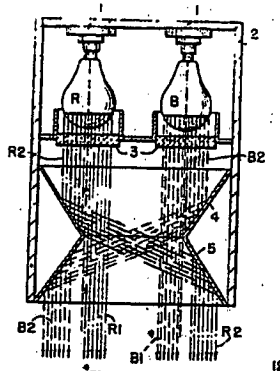


Fig-1-

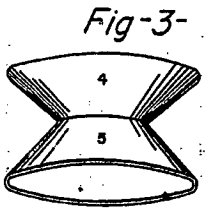


Fig-3-

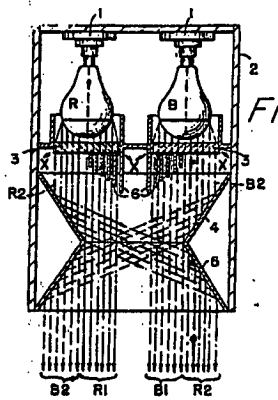


Fig-4-

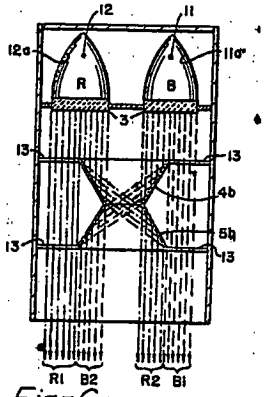


Fig-6-

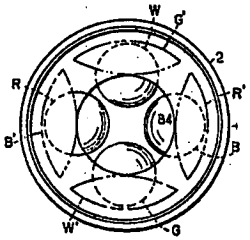


Fig-2-

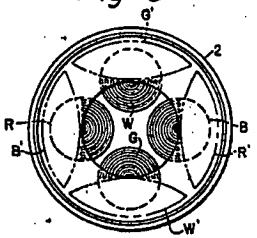


Fig-5

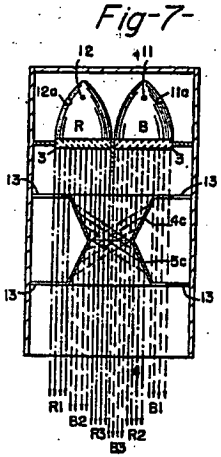


Fig-7-

686,746 COMPLETE SPECIFICATION
3 SHEETS
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SHEET 3

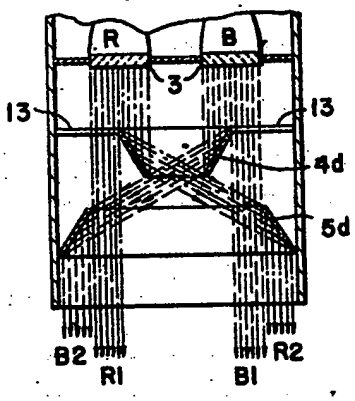

Fig-8-

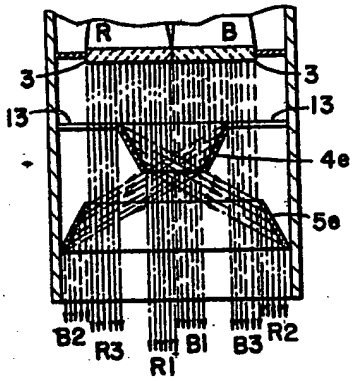

Fig-9-

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